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*Publication date:*  
2019

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

### *Citation (APA):*

Haratian, S., Niessen, F., Grumsen, F. B., Villa, M., Christiansen, T. L., & Somers, M. A. J. (2019). *Residual stress determination in oxidized bulk metallic glass using X-ray diffraction and FIB/DIC methods*. Abstract from 26th International Symposium on Metastable, Amorphous and Nanostructured Materials, Chennai, India.

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## **ISMANAM-2019**

**26<sup>th</sup> International Symposium on  
Metastable, Amorphous and Nanostructured Materials**

**July 8-12, 2019 | Chennai, India**



Organized by

Dept. of Metallurgical and Materials Engineering

Indian Institute of Technology Madras

<https://mme.iitm.ac.in/ismanam2019>

CN-4

## **Residual stress determination in oxidized bulk metallic glass using X-ray diffraction and FIB/DIC methods**

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The presence of residual stresses inside the engineering components generated by local inelastic deformation can influence material's performance considerably during mechanical loading. Surface engineering of ZrCuAl-based bulk metallic glasses (BMGs) by low-temperature ( $<T_g$ ) gaseous oxidizing is hypothesized to be possible in order to build-up compressive residual stresses in the surface region, which then results in decelerating the shear band propagation during deformation. In the current study stresses introduced as a consequence of  $ZrO_2$  ( $Al_2O_3$ ) formation on thermochemically oxidized  $(Zr_{55}Cu_{30}Al_{10}Ni_5)_{98}Er_2$  BMG were investigated. For this purpose, conventional X-ray diffraction  $\sin^2\psi$  and incremental core-ring focused ion beam (FIB) milling methods have been utilized. The BMG was initially oxidized in the controlled gaseous atmospheres imposing an extremely high  $pO_2$  at 600 K for 60 hr. The residual stress  $\sin^2\psi$  analysis was conducted on (011) reflection of the tetragonal- $ZrO_2$  peak where it reveals the existence of compressive stress in  $ZrO_2$ . Surface strain relief monitored in high-resolution SEM imaging of a deposited stochastic pattern during gradual milling and measured by digital image correlation (DIC) also indicated the occurrence of compressive residual stresses in the surface region of the oxidized BMG.